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CHEROKEE NATION

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Deputy Principal Chief

March 24, 2008

Aunjanee Gautreaux, 6PD-Q
Air Quality Analysis Section
U. S. EPA, Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

RE: CHEROKEE NATION COMMUNITY AIR TOXICS PROJECT SEVENTH QUARTER TECHNICAL REPORT

Dear Ms. Gautreaux:

Enclosed is the Seventh Quarter Technical Report (December, 2007, and January and February, 2008) for the Cherokee Nation's Community Air Toxics Project (Cooperative Agreement number XA-96619701-0). The seventh quarter financial report and MBE/WBE will be provided by the Cherokee Nation Accounting Department and by our financial staff, respectively.

If you have any questions regarding these matters, please call Ryan Callison at 918-453-5093 or Kent Curtis at 918-453-5095.

Sincerely,

Tom Elkins

Tom Elkins
Acting Administrator for Environmental Programs

Enclosure

cc: File

QUARTERLY TECHNICAL REPORT
for
CHEROKEE NATION ENVIRONMENTAL PROGRAMS (CNEP)
COMMUNITY AIR TOXICS PROJECT
(XA-96619701-0)

SEVENTH QUARTER FY2008
(DECEMBER, 2007, AND JANUARY, FEBRUARY, 2008)

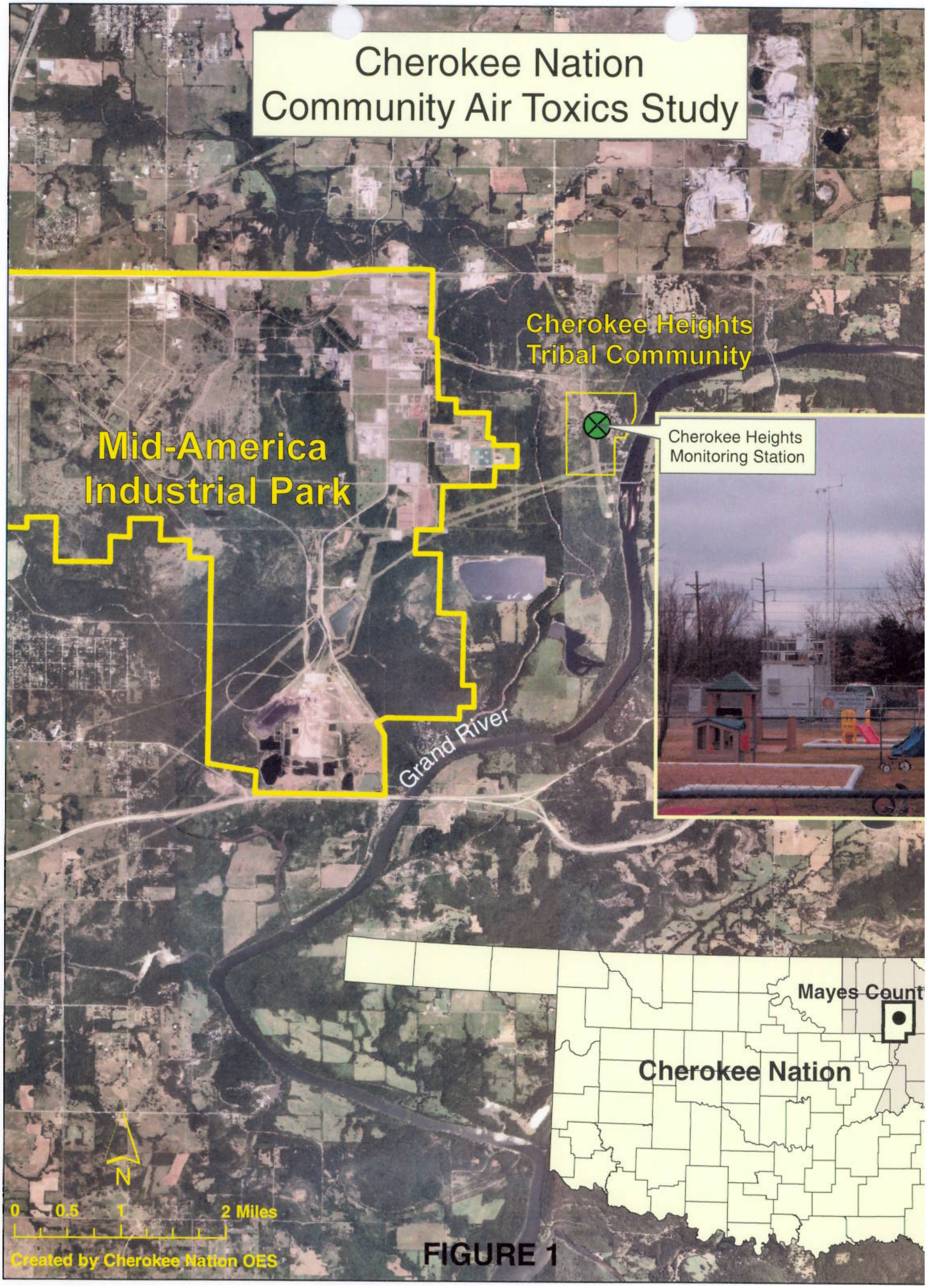
OVERVIEW OF PROJECT ORIGIN AND PURPOSE

The origin and purpose of this project are described in the first quarterly technical report for this project. In summary, the Cherokee Nation is currently conducting this 18-month VOC sampling project at its Cherokee Heights (aka, Pryor) site (**Figure 1**), collecting samples in vacuum canisters for analyses via EPA Test Method TO-15. Over 90 samples will be collected using a 1-in-6 day sampling interval. The 18-month project will document seasonal variations in VOC concentrations and will focus on hazardous air pollutants (VOC HAPs) identified as "drivers" in the 1999 NATA, as well as on VOC HAPs detected in the Cherokee Nation's screening project from the winter of 2005. Project data will be shared with the EPA, the state of Oklahoma (ODEQ), the Cherokee Nation, and the general public via AQS, XML flat file, and other means, as appropriate.

SEVENTH QUARTER GOALS, OBJECTIVES, AND ACCOMPLISHMENTS

1. Continue sample collection in accordance with the Proposed Sampling Schedule for this project. Sample collection began as scheduled on September 26, 2006. Seventy-nine samples (plus seven duplicates) were collected as of February 18, 2008. Summary information for these 86 samples is shown on the first four pages of the Proposed Sampling Schedule for this project, which is included as **Appendix A** of this quarterly technical report. Eleven samples – collected on December 1st, December 25th, April 18th, June 29th, October 3rd, December 26th, and February 24th – were invalid (unusable) because the sample canisters had internal pressures of zero at the end of sample collection or because a leak from the canisters was suspected or because the sample period was too long. Duplicate samples scheduled for October 9th could not be collected because no sample canisters were available on that date. A further explanation of problems encountered with sample collection and analysis is included in the "Problems Encountered" section of this quarterly technical report.

2. Perform NATTS Certification and flow verification check on backup RM910A sampler. The CNEP sent its backup sampler to ERG for an EPA Compendium Method TO-15 "canister sampling system certification" (aka, NATTS Certification) in February, 2007. ERG performed this certification on February 5 and the sampler passed the certification. ERG returned the sampler to the CNEP in February, but the CNEP has not yet performed a flow verification check on it.



Cherokee Nation
Community Air Toxics Study
Cherokee Heights
Tribal Community
Cherokee Heights
Monitoring Station
Mid-America
Industrial Park
Grand River
Mayes Count
Cherokee Nation
N
0 0.5 1 2 Miles
Created by Cherokee Nation OES

FIGURE 1

3. ERG will begin reporting sample data to the CNEP within 45 days after the completion of the first month of sample collection. The CNEP received lab data for its first seven samples – collected from September 26th through October 26th – from ERG in December, 2006. Subsequently, the CNEP received data for samples collected from November, 2006 through December, 2007. The CNEP has analyzed this data. The CNEP's Data Summary reports are included in **Appendix B** of this quarterly technical report, along with CNEP tables of all the data. The data tables were compiled to facilitate the discovery and analysis of any seasonal trends in the data. ERG posted the data for July 5th through September 27th, 2007 to the AQS website in January, 2008.

4. ERG will provide the CNEP with a statistical analysis of the project data for calendar year 2007. On January 28th and 31st, 2008 Kent Curtis (CNEP) and Julie Swift (ERG) discussed the content and format of the final project report that ERG will submit to the CNEP by June, 2008. They agreed on the content and format of this report, which will include statistical analyses of the project data.

5. The CNEP will begin revising its *Quality Assurance Project Plan and Work Plan* for this VOC monitoring project. Revision of the *Quality Assurance Project Plan and Work Plan* for this project was delayed because of Kent Curtis' medical leave of absence. Aunjanee Gautreaux of the EPA office in Dallas extended the approval of the existing QAPP through January 26, 2008. The CNEP completed revision of the QAPP on December 12, 2007 and submitted it to Aunjanee Gautreaux for approval. It was approved by the EPA on January 17, 2008. (No further revisions are needed.)

Summary of Seventh Quarter Goals, Objectives, and Accomplishments. The goals and objectives of this project, including overall goals, have not changed from the original CNEP application for funding. Seventh quarter goals and objectives for this project were to continue sample collection, analyze sample data, obtain NATTS certification for the CNEP's backup RM910A sampler, reach agreement with ERG on the content and format of the final project report, and complete revision and approval of the project QAPP. These goals and objectives have been met. No significant difficulties or delays were encountered in meeting these seventh quarter goals and objectives. Approval of the existing QAPP was extended to January, 2008, and the revised QAPP was approved on January 17, 2008. In summary, work for this project is on schedule.

Project Timeline and Milestones. The following list shows the timeline and milestones for the entire two-year duration of this project. *Milestones that have been met are shown in italics.*

(1) Cherokee Nation will receive EPA approval of its QAPP for this project by June 1, 2006, or by the end of the second month of the project. *The original QAPP/Work Plan for this project was approved by the EPA in February, 2006. The CNEP revised this original QAPP in September, 2006, and the revised QAPP was approved by EPA on October 26, 2006. A second revision of the QAPP was submitted to EPA for approval in December, 2007, and it was approved on January 17, 2008.*

(2) Cherokee Nation will solicit bids from labs for sample analysis during the first month of the project and will select the winning bid and award the contract by the beginning of the third month of the project. *ERG was selected (August, 2006) to analyze project samples and perform data reporting for the project.*

(3) Cherokee Nation will begin sample collection by the beginning of the third month (September, 2006) of the project, or by the date of project QAPP approval by EPA, whichever is later. *Sample collection for this project began on September 26, 2006. As of February 24, 2008, seventy-nine samples (plus seven duplicate samples) had been collected for this project.*

(4) Cherokee Nation will begin data analysis as soon as the first data is received from lab. Data analysis will continue to the end of the project on May 31, 2008. *The CNEP began receiving lab data from ERG in December, 2006. As of February, 2008, the CNEP had analyzed ERG data for the first seventy-six samples – collected from September 26, 2006 through December 20, 2007. Data analysis will be an ongoing activity until the end of this project in May, 2008.*

(5) Cherokee Nation will complete sample collection by the end of 18 months of sampling (March, 2008).

(6) ERG will submit sample data to CNEP within 45 days after the end of each month of sample collection. ERG will submit statistical analyses of data and quality assurance reports to CNEP at the end of each year of the project. *ERG began submitting sample data to the CNEP in December, 2006 (see Project Timeline and Milestone item 4 above).*

(7) ERG, under the terms of its contract with CNEP, will post project data to AQS within 90 days of the end of each calendar quarter. Posting of project data to AQS will begin as early as the 9th month (March, 2007) of the project. ERG will complete final posting of project data to AQS within 90 days after the conclusion of the project on May 31, 2008. *ERG posted project data for September, 2006 through June, 2007 to the AQS website in March, June, and September, 2007. ERG posted project data for July, 2007 through September, 2007 to the AQS website in January, 2008. Submission of data to AQS will be an ongoing activity until the end of this project.*

(8) Cherokee Nation will host public meeting to present results of project to residents of Cherokee Heights no later than the final month of the project (May, 2008).

(9) Cherokee Nation will submit final project report to EPA within 90 days after the conclusion of the project on May 31, 2008. Quarterly technical reports will be submitted to EPA within 30 days after the end of each three-month quarter of each fiscal year.

CHANGES IN KEY PERSONNEL INVOLVED IN PROJECT

The following seven persons in the CNEP air quality monitoring program are working on this project:

Ryan Callison, Project Manager
Kent Curtis, Project QA/QC Manager
April Hathcoat, Environmental Specialist II
Jacque Adam, Environmental Specialist I
Jeremy Freise, Environmental Specialist I
Danielle Keese, Environmental Specialist I
Larry Scrapper, Environmental Specialist I

Ryan has overall responsibility for the project. Kent is responsible for project planning, project oversight, and QA/QC management. Kent and April are responsible for project data management. April, Jacque, Jeremy, Danielle, and Larry have primary responsibility for sample collection and equipment maintenance, while Kent and Ryan may also assist with such tasks.

ERG is the laboratory responsible for sample analyses and data reporting for the project. Key contacts at ERG are Julie Swift (project oversight), Ray Merrill (QA oversight), Dave Dayton (Method TO-15 canister sampling system certification), and Rodney Williams (canister sample shipping and receiving).

Figure 2 is an organizational chart showing all parties involved in this project. Those personnel named in the preceding paragraphs are directly involved in this project while other parties shown in **Figure 2** play supporting roles in the project. Tom Elkins replaced Jeannine Hale as Acting Administrator of CNEP in January, 2008, and Melanie Knight replaced Diane Hammons as Group Leader of Cherokee Nation Environmental Programs at that time.

EXPENDITURES TO DATE

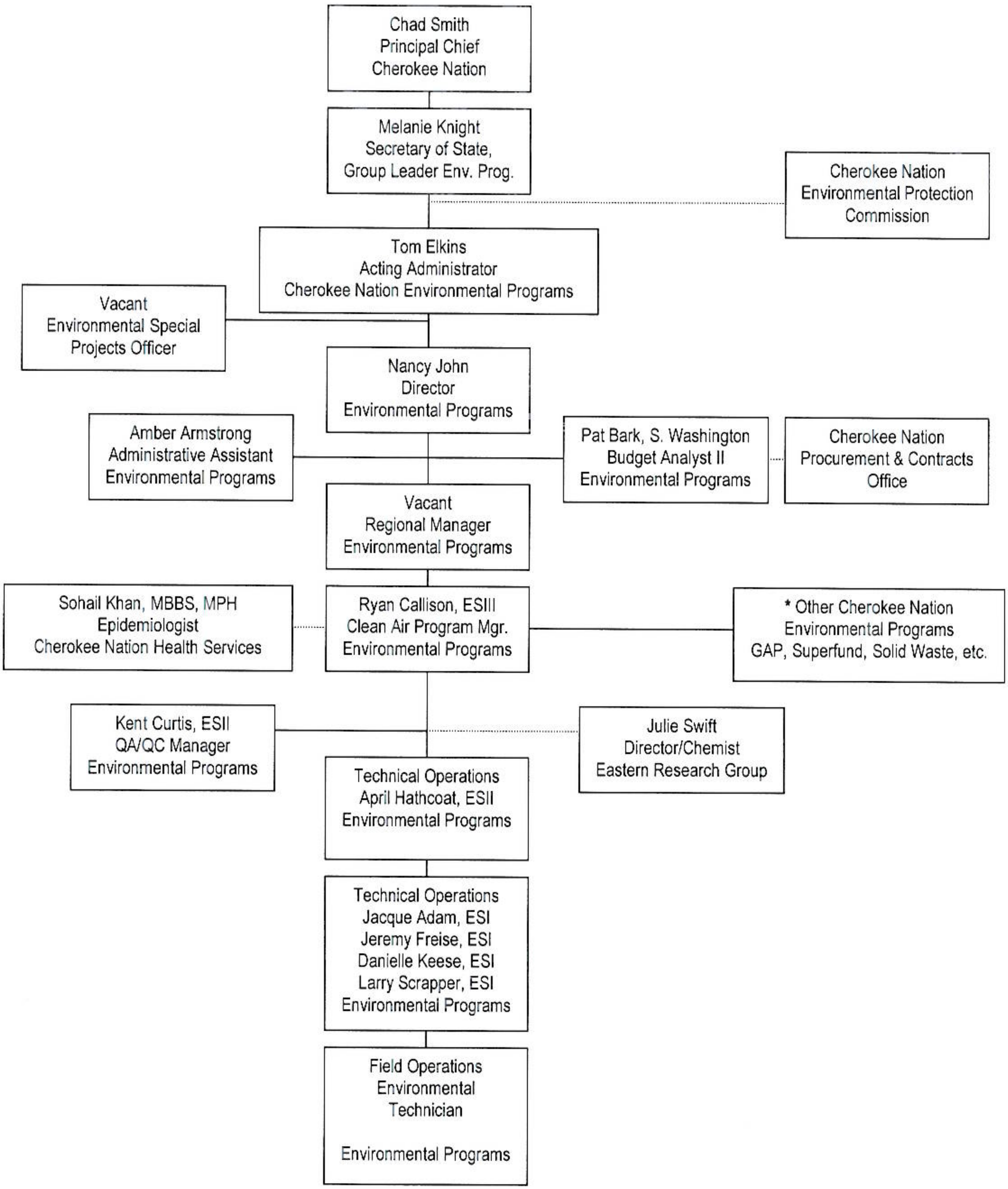
A total of $141,447.44 of the $165,000 awarded for this grant was spent or obligated by the CNEP by the end of the seventh quarter of this project. Most of the money spent or obligated was for one-time expenditures: $47,520 obligated to ERG for the performance of sample analyses and data reporting during the period from September, 2006 through August, 2008; and $4,522 obligated to RM Environmental, Inc. for a backup RM910A sampler and spare parts (seals, etc.) for the primary RM910A sampler. The remaining expenditures through the end of the seventh quarter were $21,861 for salaries, $29,041 for fringe benefits, $9,709 for travel, $2,112 for supplies (including two Restek sample canisters), $9,729 for other costs, and $12,199 for indirect costs. Thus expenditures and obligations through the end of the seventh quarter are within the overall budget for the project. In other words, expenditures for salaries, fringe benefits, indirect costs, and other expenses are not expected to exceed the total awarded for the two-year life of the grant.

COMPLIANCE WITH QUALITY ASSURANCE REQUIREMENTS

The CNEP's original QAPP/Work Plan for this project was approved by the EPA in February, 2006. A revision of this QAPP was completed by the CNEP on September 21,

Cherokee Nation Environmental Programs
Organizational Chart

Figure 2



Note: *Chart shows only those CNEP staff directly involved in the Community Air Toxics Project

AWARD CATEGORY/	BUDGET	EXPENDITURES	ENCUMBRANCE	COMMITMENT	TOTAL	BALANCE
Personnel	$ 31,769.00	$ 21,861.25	$ -	$ -	$ 21,861.25	$ 9,907.75
Fringe	$ 11,078.00	$ 29,041.49	$ -	$ -	$ 29,041.49	$ (17,963.49)
Travel	$ 9,011.00	$ 9,709.04	$ -	$ -	$ 9,709.04	$ (698.04)
Contractual	$ 77,000.00	$ 31,284.00	$ 20,988.00	$ -	$ 52,272.00	$ 24,728.00
Supplies	$ 3,400.00	$ 2,112.43	$ -	$ -	$ 2,112.43	$ 1,287.57
Equipment	$ 6,995.00	$ 4,522.00	$ -	$ -	$ 4,522.00	$ 2,473.00
Other	$ 13,600.00	$ 9,729.28	$ -	$ -	$ 9,729.28	$ 3,870.72
IDC	$ 12,147.00	$ 12,199.95	$ -	$ -	$ 12,199.95	$ (52.95)
	$ 165,000.00	**$ 120,459.44**	**$ 20,988.00**	**$ -**	**$ 141,447.44**	**$ 23,552.56**

2006 and was approved by the EPA on October 26, 2006. EPA approval of this QAPP was extended to January 26, 2008. The CNEP completed a revision of this QAPP and submitted it to EPA for approval on December 12, 2007. This revision was approved by the EPA on January 17, 2008. correct...

In addition, the CNEP is operating under a Quality Management Plan (QMP) approved by the EPA on May 9, 2007. The CNEP air quality monitoring program is also operating under several other EPA-approved QAPPs, including QAPPs for criteria pollutant monitoring (including meteorological instruments) and for PM2.5 and PM10 monitoring.

The contracted laboratory, ERG, is operating under the following EPA-approved QAPP: *Support for the EPA National Monitoring Programs (NMOC, UATMP, PAMS, HAPs, and NATTS)* for 2007/2008.

RESULTS TO DATE

Seventy-nine valid samples (plus seven valid duplicates) were collected from September 26, 2006 through February 24, 2008 (see first four pages of **Appendix A** in this quarterly technical report). Eleven additional samples were declared invalid by the CNEP due to problems that affected data quality. ERG has submitted data for 76 valid samples – collected from September 26, 2006 through December 20, 2007 – to the CNEP and the CNEP has analyzed this data. The CNEP's Data Summary reports are included in **Appendix B** of this quarterly technical report, along with CNEP tables of all the data. The data tables were compiled to facilitate the discovery and analysis of any seasonal trends in the data. ERG posted the data for September 26th, 2006 through June 23rd, 2007 to the AQS website in March, June, and September, 2007. ERG posted project data for July, 2007 through September, 2007 to the AQS website in January, 2008.

The number of VOCs detected in each of the first 76 samples ranged from 14 to 30. The concentrations of the detected VOCs were compared to the following benchmarks: EPA Region 6 Human Health Medium-Specific Screening Levels, including chronic inhalation toxicity values (non-cancer and cancer values), and including screening values for ambient air; Oklahoma Department of Environmental Quality (ODEQ) MAACs; and ATSDR Minimal Risk Levels (MRLs) for inhalation. The concentrations of 3 to 7 of the detected VOCs equaled or exceeded one or more of these benchmarks in each sample. The VOCs exceeding these benchmarks were as follows: acrolein; chloromethane; 1,3-butadiene; chloroform; benzene; carbon tetrachloride; trichloroethylene; and 1,2-dichloroethane. A more detailed analysis of these results is included in **Appendix B** of this quarterly technical report.

Kent Curtis (CNEP) and Julie Swift (ERG) reached an agreement on January 31st about the format and content of the final project report that ERG will submit to the CNEP in June, 2008. This agreement is included in **Appendix D** of this quarterly report. The final project report will include human health risk estimates for detected VOCs and statistical analyses of sample data.

In February, 2008 the CNEP received a request from Marcy Klass-Jones for information about VOC monitoring at Cherokee Heights. Marcy was requesting the information on behalf of a friend of hers who lives in or near the Cherokee Heights tribal housing addition. Kent Curtis (CNEP) sent Marcy a letter and some basic information about such monitoring on February 20th. This letter and its enclosures are included as **Appendix E** of this quarterly report.

PROBLEMS ENCOUNTERED

No serious problems were encountered during the seventh quarter of this project. Several minor problems that occurred during the seventh quarter are described here. Another problem (MDLs) that has carried over from the third quarter is also discussed.

Four of the first ten duplicate samples collected for this project were invalid samples, whereas only three of the first 75 single samples collected were invalid. Thus there has been a greater incidence of problems with duplicate samples than with single samples. Kent Curtis investigated the possible causes of these problems with duplicate samples. The purpose of his investigation was to identify the problems that cause invalidation of samples and to reduce the future incidence of invalid duplicate samples. Kent summarized his findings in a report that is included in **Appendix C** of this quarterly report. Kent distributed this report to the CNEP staff on January 3, 2008 and made two recommendations for action (see **Appendix C**). The first recommendation was to perform a flow check on the RM910A sampler. The second recommendation was to inspect sample canisters, tubing, and connectors for damage or defects. These actions have been implemented by the CNEP staff.

CNEP staff performed a flow check on the RM910A sampler on January 16, 2008 The sampler passed the flow check, thus eliminating the sampler's mass flow controller as a cause of invalid samples. All canisters and tubing also passed visual inspections. Thus there is no obvious reason why a disproportionate number of duplicate samples have been invalid.

Four duplicate samples have been collected since these actions were taken, and one of those four samples was invalid. The one invalid duplicate sample was collected on February 24th (see **Appendix A**). There was no obvious reason why this sample finished with a final canister pressure of +22, although one of the two canisters used for this sample was not a CNEP canister. An additional duplicate sample was collected on March 1st to make up for the invalid sample of February 24th. The March 1st duplicate sample was a valid sample.

Nine valid duplicate samples were collected for this project. This meets the QA/QC requirement (described in Section 2.1 of the Quality Assurance Project Plan/Work Plan for this project) that ten percent of all project samples must be duplicate samples.

Method Detection Limits (MDLs) reported by ERG for samples collected in 2007 are higher than the MDLs reported for samples collected for this project in 2006. Fourteen of these higher MDLs are higher than the EPA Region 6 Human Health Screening Levels to which project data are being compared. If possible, the MDLs for all VOCs included in this project should be *lower* than the Screening Levels. If MDLs are *higher* than these Screening Levels, then it is likely that false negatives will be reported for VOCs of particular concern in this project. That is, data may falsely show that a particular VOC is not present at a concentration higher than a Screening Level when, in fact, that VOC may actually be present at a concentration higher than the Screening Level but lower than the MDL achieved by the lab. [See Data Summary in **Appendix B** for further discussion of this problem.] The CNEP conferred with ERG to determine the cause of the higher MDLs reported for the samples collected in 2007. ERG explained that it recalculates its MDLs at the beginning of each calendar year. The new MDLs are then used for the next twelve months. These new MDLs may be higher, lower, or the same for any given VOC as the MDLs used during the previous year. Thus the new MDLs must be used, even if they are higher than a Screening Level of concern. This limits the usefulness of some project data and forces the CNEP to accept the possibility of false negatives for some VOCs of concern, including 1,3-butadiene, acrolein, carbon tetrachloride, and trichloroethylene.

Of the first 97 samples collected (including nine duplicates) from September 26, 2006 through February 24, 2008, 86 samples yielded valid (useable) data. Duplicate samples scheduled for October 9th could not be collected because no sample canisters were available at that time. Thus the data completion rate for the first seventeen months of sample collection (97 collected samples plus 2 missed samples) is 86.9%. This meets the desired data completion rate of 85%, which is specified in Section 2.5 of the Revised QAPP/Work Plan for this project.

ACTIVITIES PLANNED FOR EIGHTH QUARTER OF THIS PROJECT

1. Complete sample collection in accordance with the Proposed Sampling Schedule for this project (see **Appendix A** of this quarterly technical report).

2. The CNEP will perform a flow verification check on its NATTS-certified primary RM910A sampler after the final sample has been collected on March 25th.

3. ERG will continue reporting sample data to the CNEP at monthly intervals. ERG, under the terms of its contract with CNEP, will continue posting project data to AQS within 90 days of the end of each calendar quarter.

4. ERG will provide the CNEP with a final project report in June, 2008. The format and content of this final report are described in **Appendix D** of this quarterly report.

5. The CNEP will produce a supplementary report (data tables and project summary) to be included with ERG's final project report. These reports will be submitted to the EPA in June, 2008.

6. Copies of the final project report and supplementary report will be shared with the Oklahoma Department of Environmental Quality, Cherokee Nation Health Services, and with other interested parties. A public meeting may be held to present the project findings to residents of the Cherokee Heights tribal housing addition. A decision of whether or not to hold such a meeting will depend on the degree of interest of Cherokee Heights residents and the degree of risk posed by VOCs in ambient air to the health of Cherokee Heights residents. At this time, the degree of risk appears to be minimal (see enclosures in **Appendix E**).

PUBLICATIONS ARISING FROM THIS PROJECT

The CNEP will present the results of this project at one or more regional or national conferences as project data become available. Such presentations will occur in 2007 and 2008. Kent Curtis attended the Air and Waste Management Association's Symposium on Air Quality Measurement Methods and Technology in San Francisco on April 30-May 2, 2007. He gave a brief presentation on the CNEP's Community Air Toxics Project, including a summary of sample data collected as of February, 2007. This presentation will be published in the proceedings of the symposium. There are no plans at this time to publish the final results of this project.

The CNEP will share data from this project with the Cherokee Nation's Health Services department. The CNEP and the CN Health Services may jointly host a public meeting to present results of this project to residents of Cherokee Heights no later than the final month of the project (May, 2008).

APPENDIX A

PROPOSED SAMPLING SCHEDULE FOR THIS PROJECT

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
1	2280	2280	September	26	2006	Tue		
2A	2275	2275	October	2	2006	Mon		
2B	2272	2272	October	2	2006	Mon	Yes	
3	2276	2276	October	10	2006	Tue		Make-up for sample that didn't run on 10/8
4	2284	2284	October	18	2006	Wed		Make-up for sample that didn't run on 10/14
5	3357	3357	October	20	2006	Fri		Graseby canister
6	3359	3359	October	26	2006	Thur		Graseby canister; shelter temp 130 on 10/24
7	2275	2275	November	1	2006	Wed		
8A	2272	2272	November	7	2006	Tue		
8B	2280	2280	November	7	2006	Tue	Yes	
9	2276	2276	November	13	2006	Mon		
10	2284	2284	November	19	2006	Sun		
11	3357	3357	November	25	2006	Sat		Graseby canister
12	3359	3359	December	1	2006	Fri		Graseby canister, +2 final canister pressure at Pryor, 0 at ERG; INVALID SAMPLE
13	2275	2275	December	7	2006	Thur		
14	2272	2272	December	13	2006	Wed		
15	2280	2280	December	19	2006	Tue		
16	3627	3627	December	25	2006	Mon		0 final canister press.; INVALID SAMPLE
17	3628	3628	December	31	2006	Sun		New Year's Eve
18	2275	2275	January	6	2007	Sat		
19A	2284	2284	January	12	2007	Fri		
19B	2272	2272	January	12	2007	Fri	Yes	
20	2276	2276	January	18	2007	Thur		
21	2280	2280	January	24	2007	Wed		

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
22	3627	3627	January	30	2007	Tue		
23	3628	3628	February	5	2007	Mon		
24	2272	2272	February	11	2007	Sun		
25	2284	2284	February	17	2007	Sat		
26	2276	2276	February	23	2007	Fri		
27	2280	2280	March	1	2007	Thur		
28	3627	3627	March	7	2007	Wed		
29	2284	2284	March	13	2007	Tue		
30	2272	2272	March	19	2007	Mon		
31	3628	3628	March	25	2007	Sun		
32	2276	2276	March	31	2007	Sat		
33	2280	2280	April	6	2007	Fri		
34	2284	2284	April	12	2007	Thur		
35A	3627	3627	April	18	2007	Wed		+2 final can press, INVALID SAMPLE
35B	2275	2275	April	18	2007	Wed	Yes	+2 final can pr; suspected leak, INVALID
36	3628	3628	April	24	2007	Tue		
37A	2275	2275	April	30	2007	Mon		
37B	3627	3627	April	30	2007	Mon	Yes	
38	2272	2272	May	6	2007	Sun		
39	2276	2276	May	12	2007	Sat		
40	2280	2280	May	18	2007	Fri		
41	2284	2284	May	24	2007	Thur		
42	3627	3627	May	30	2007	Wed		
43	3628	3628	June	5	2007	Tue		

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
44	2275	2275	June	11	2007	Mon		
45	2272	2272	June	17	2007	Sun		
46	3627	3627	June	23	2007	Sat		Dup. can couldn't run, 0 initial pressure
47A	2276	2276	June	29	2007	Fri		Sample ran for 110.04 hrs, INVALID
47B	2280	2280	June	29	2007	Fri	Yes	Sample ran for 110.04 hrs, INVALID
48	3628	3628	July	5	2007	Thur		
49A	2275	2275	July	11	2007	Wed		Make-up duplicate for June 29
49B	2272	2272	July	11	2007	Wed	Yes	Make-up duplicate for June 29
50	3359	3359	July	17	2007	Tue		Graseby canister
51	3627	3627	July	23	2007	Mon		
52	2280	2280	July	29	2007	Sun		
53A	2272	2272	August	4	2007	Sat		
53B	2275	2275	August	4	2007	Sat	Yes	
54	3628	3628	August	10	2007	Fri		
55	2280	2280	August	16	2007	Thur		
56	2276	2276	August	22	2007	Wed		
57	3627	3627	August	28	2007	Tue		
58	2275	2275	September	3	2007	Mon		Labor Day
59	3359	3359	September	9	2007	Sun		Graseby canister
60	3628	3628	September	15	2007	Sat		
61	2280	2280	September	21	2007	Fri		
62	2276	2276	September	27	2007	Thur		
63	2272	2272	October	3	2007	Wed		Sample ran for 33.06 hrs, INVALID
64A	-	-	October	9	2007	Tue		No sample, no canister available
64B	-	-	October	9	2007	Tue	Yes	No sample, no canister available

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
65	3627	3627	October	15	2007	Mon		
66	2280	2280	October	21	2007	Sun		
67	2272	2272	October	27	2007	Sat		
68	3628	3628	November	2	2007	Fri		
69	2276	2276	November	8	2007	Thur		
70	3627	3627	November	14	2007	Wed		
71	2280	2280	November	20	2007	Tue		
72	2284	2284	November	26	2007	Mon		
73	2275	2275	December	2	2007	Sun		
74	3628	3628	December	8	2007	Sat		
75	2272	2272	December	14	2007	Fri		
76	2280	2280	December	20	2007	Thur		
77A	2284	2284	December	26	2007	Wed		0 final can pressure, INVALID
77B	2276	2276	December	26	2007	Wed	Yes	0 final can pressure, INVALID
78	3627	3627	January	1	2008	Tue		NY Day
79	2275	2275	January	7	2008	Mon		
80	3628	3628	January	13	2008	Sun		
81A	2276	2276	January	19	2008	Sat		
81B	2284	2284	January	19	2008	Sat	Yes	
82	2280	2280	January	25	2008	Fri		
83	3627	3627	January	31	2008	Thur		
84	2272	2272	February	6	2008	Wed		
85	2276	2276	February	12	2008	Tue		
86	2284	2284	February	18	2008	Mon		

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
87A	3628	3628	February	24	2008	Sun		+22 final can pressure, INVALID?
87B	AZ26	AZ26	February	24	2008	Sun	Yes	+22 final can press., INVALID; not a CN canister
88A	3627	3627	March	1	2008	Sat		
88B	2272	2272	March	1	2008	Sat	Yes	
89	2280	2280	March	7	2008	Fri		
90A	2275	2275	March	13	2008	Thur		
90B	3628	3628	March	13	2008	Thur	Yes	
91			March	19	2008	Wed		
92			March	25	2008	Tue		

APPENDIX B

CNEP DATA SUMMARY REPORTS
AND DATA TABLES
FOR SAMPLES COLLECTED FROM
SEPTEMBER 26, 2006 THROUGH DECEMBER 26, 2007

DATA SUMMARY
FOR VOC SAMPLES COLLECTED AT CHEROKEE NATION'S PRYOR SITE
FROM OCTOBER 3 THROUGH DECEMBER 26, 2007

I have analyzed the data for our twelve valid VOC samples of the autumn season, which were collected from October 15 through December 20, 2007. The following is a summary of my analyses.

Twelve of the fifteen samples collected in October, November, and December were valid samples, as the canisters had final pressures that were less than zero or more than zero. One sample was invalid because it was collected over a period of 33.06 hours on October 3rd and 4th. Duplicate samples were not collected as scheduled on October 9th because no sample canisters were available. Duplicate samples collected on December 26th were invalid because both sample canisters had final pressures of zero. Data completeness (12 valid samples out of 17 scheduled samples) = 71%. This is less than the desired data completion rate of 85%.

ERG analyzed each of the 12 valid samples for 60 VOCs.

The number of VOCs detected in each sample ranged from 17 (October 27 and December 14) to 23 (November 26 and December 8). The average number of VOCs detected in each sample was 19.9, which was just higher than the average of 18.9 VOCs detected in the 16 valid samples collected during the winter of 2007 but lower than the average of 26.1 VOCs detected in the 17 valid samples collected during the autumn of 2006, and lower than the average of 21.6 VOCs detected in the 17 valid samples collected during the summer of 2007.

The lab (ERG) reported the same MDLs for samples collected in October, November, and December as for the samples collected in February through September. 12 of these MDLs achieved for VOCs in samples collected in February through December were higher than one of the EPA Region 6 Human Health Medium-Specific Screening Levels of concern. [These screening levels are described in the following paragraph.] **MDLs in excess of a screening level are of concern because they include the MDLs for 1,3-butadiene, acrolein, carbon tetrachloride, and trichloroethylene – four of the VOCs that exceeded a screening level in one or more samples collected in the autumn of 2006, and in the winter, spring, and summer of 2007. These higher MDLs make it more likely that false negatives will be reported for VOCs of particular concern. The probability of false negatives must be reduced in future sample analyses.**

I compared the concentrations of detected VOCs in the October, November, and December samples to the following benchmarks:

EPA Region 6 Human Health Medium-Specific Screening Levels
Chronic inhalation toxicity values (non-cancer and cancer values)
Region 6 Screening values for ambient air
Oklahoma Department of Environmental Quality (ODEQ) MAACs
ATSDR Minimal Risk Levels (MRLs) for inhalation

3 to 6 detected VOCs equalled or exceeded one or more of these benchmarks in each sample. The VOCs exceeding these benchmarks were as follows:

Acrolein, exceeding a benchmark in all 12 valid samples, with a concentration range in these twelve samples of 0.85 to 2.05 ug/m3.

Chloromethane, exceeding a benchmark in 9 samples, with a concentration range in these nine samples of 1.13 to 1.91 ug/m3.

1,3-Butadiene, exceeding a benchmark in 2 samples, with a concentration range in these two samples of 0.04 to 0.10 ug/m3.

Chloroform, exceeding a benchmark in 8 samples, with a concentration range in these eight samples of 0.09 to 0.11 ug/m3.

Benzene, exceeding a benchmark in all 12 valid samples, with a concentration range in these twelve samples of 0.38 to 0.86 ug/m3.

Carbon tetrachloride, exceeding a benchmark in all 12 valid samples, with a concentration range in these twelve samples of 0.54 to 1.00 ug/m3.

Chloromethane and chloroform exceeded only screening levels.

Benzene and carbon tetrachloride exceeded both screening levels and cancer benchmarks.

Acrolein exceeded both screening levels and a non-cancer benchmark. In addition, acrolein was the only VOC to exceed an ATSDR MRL (in all 12 valid samples) and an ODEQ MAAC (on November 14).

The duplicate samples scheduled for October 9th could not be collected because no sample canisters were available at that time. Duplicate samples collected on December 26th were invalid because their final canister pressures were zero.

The benzene/toluene ratios in the three valid samples ranged from 0.6 to 2.30. These ratios are NOT characteristic of vehicular (gasoline engine) emissions.

The concentrations of carbon tetrachloride and chlorofluorocarbons [Dichlorodifluoromethane (freon 12), Dichlorotetrafluoroethane (freon 114), Trichlorofluoromethane (freon 11), and Trichlorotrifluoroethane] detected in the twelve samples were relatively stable. The concentration ranges of each of these VOCs in the twelve samples were as follows: carbon tetrachloride (0.54 to 1.00 ug/m3); Freon 12 (2.07 to 3.66 ug/m3); Freon 114 (0.08U to 0.15 ug/m3, and being undetected in one sample); Freon 11 (1.23 to 2.06 ug/m3, and being undetected in one sample); and trichlorotrifluoroethane (0.61 to 1.24 ug/m3). This is consistent with the fact that such VOCs have stable global background concentrations in the USA.

There were no exceedances of NAAQS standards (24-hour or 8-hour standard, as applicable) for NO2, SO2, PM10, PM2.5, and ozone at the Pryor station on any of the twelve valid VOC sample days.

Finally, the wind direction was predominantly from the south-southwest or south-southeast at 0 to 16 mph on October 15 and 21, and on November 8 and 20. The wind was from the north at 1 to 27 mph on November 14. The wind was calm on October 27 and on November 2. Wind direction data for these sample dates were obtained from the University of Oklahoma Mesonet station near Pryor because the wind direction indicator at the Cherokee Nation's Pryor site was not in service on those dates. The OU Mesonet station is 9.75 miles north of the Cherokee Nation's Pryor site.

The wind was predominantly from the east and northeast at 2 to 10 mph on December 8, 14, and 20. The wind was from the east, southeast, and south at 2 to 18 mph on December 2; and it was from the north, northeast, and east at 0 to 10 mph on November 26.

The Cherokee Heights tribal housing complex and the city of Locust Grove lie to the east and southeast of the Pryor monitoring station; U. S. highway 412 lies south of the station; Mid-America Industrial Park lies to the west, southwest, and northwest of the station; and other industry lies to the northeast of the station.

There was no rainfall on seven of the twelve valid sample dates, while 0.02 to 0.15 inches of rain fell on October 15, November 26, December 2, December 8, and December 14. Ambient air temperatures ranged from a low of 31 degrees F on November 26 and December 14 to a high of 81 degrees F on October 21.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS

Analysis of the 76 valid samples collected from September 26, 2006 to December 20, 2007 revealed no obvious seasonal trends in occurrences or concentrations of VOCs (see attached Tables of seasonal trends data), although the data has not been subjected to statistical analysis. The decline in the average number of VOCs detected in the 2007 samples was an artifact of the higher MDLs achieved by the lab for those samples (see discussion of MDLs above). Otherwise, particular VOCs did not appear or disappear with the changing seasons, and the concentrations of detected VOCs did not show a tendency to rise or fall with the changing seasons. The concentrations of detected VOCs remained steady, fluctuating within a narrow range of concentrations that showed little or no change with the seasons. The concentrations of some VOCs remained remarkably constant, perhaps because they were present only at concentrations that were very close to the method detection limits that the lab (ERG) could achieve.

Of the eight VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of the 76 valid samples, only acrolein showed a very slight tendency to change in concentration with the seasons. Acrolein was present at its highest concentrations in September and early October, 2006, then declined very slightly in concentration after mid-October. Six of the other seven VOCs showed no tendency to rise or fall in concentration with the changing seasons, while the remaining VOC (1,2-dichloroethane) was detected in only one sample (November 25, 2006). Meanwhile, the concentrations of carbon tetrachloride were mostly at the low end of their range during the months of January and February, 2007.

ERG analyzed each of the 12 valid samples collected in October, November, and December, 2007 for a suite of 60 VOCs (see attached Table of seasonal trends data). 10 VOCs were detected in all 12 valid samples, while 11 other VOCs were detected in 8 to 11 samples. Of the six VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of these 12 valid samples, four (acrolein, chloromethane, benzene, and carbon tetrachloride) were detected in all 12 samples.

Conversely, 32 VOCs were undetected in all 12 samples, while the 7 remaining VOCs were detected in 1 to 4 samples.

There are relatively stable global background concentrations of carbon tetrachloride and chlorofluorocarbons (such as freons) in the atmosphere. Therefore, it was no surprise that carbon tetrachloride and three of the other four chlorofluorocarbons included in sample analyses for this project were detected in 11 or 12 valid samples collected in October, November, and December at concentrations that showed no tendency to vary with the changing seasons.

VOC concentrations in the four samples collected on a Saturday or Sunday did not appear to differ significantly from VOC concentrations in samples collected on week days during October through December. Thus there are few, if any, noticeable changes in VOC concentrations on weekends, when industrial activity at Mid-America Industrial Park and other nearby industries might be expected to decline.

In summary, fifteen months of VOC data have been collected so far, and, as yet, no seasonal trends have become apparent in the occurrences and concentrations of VOCs.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

15 October to 26 December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	**Valid Sample Dates** **														
	Wed 10/3	Tues 10/9	Mon 10/15	**Sun 10/21**	**Sat 10/27**	Fri 11/2	Thurs 11/8	Wed 11/14	Tues 11/20	Mon 11/26	**Sun 12/2**	**Sat 12/8**	Fri 12/14	Thurs 12/20	Wed 12/26
Acetylene			0.30	0.26	0.73	1.64	0.61	1.25	0.23	1.75	0.67	1.60	0.56	0.93	
Propylene			0.37	0.21	0.26	0.86	0.19	0.43	0.27	0.57	0.39	1.05	0.45	0.35	
Dichlorodifluoromethane (Freon 12)			2.83	2.53	2.19	2.17	2.07	2.68	3.66	3.09	3.08	2.47	2.52	2.52	
Chloromethane			**1.19**	1.06	0.54	**1.23**	0.84	**1.33**	**1.91**	**1.33**	**1.76**	**1.13**	**1.23**	**1.23**	
Dichlorotetrafluoroethane (Freon 114)			0.13U	0.12U	0.09U	0.08U	ND	0.09U	0.15	0.15	0.13U	0.08U	0.11U	0.11U	
Vinyl Chloride			ND	ND	ND	0.03U	ND	0.02U	ND	0.01U	ND	ND	ND	ND	
1,3-Butadiene			ND	ND	0.02U	ND	ND	ND	ND	**0.04**	0.02U	**0.10**	0.03U	0.03U	
Bromomethane			0.04U	0.05U	0.02U	ND	0.07U	ND	0.06U	0.05U	0.05U	0.05U	0.05U	0.05U	

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in this sample. U = Under detection limit.

Sample of October 3rd was invalid because it was collected over a period of 33.06 hours, from October 3rd through October 4th. Duplicate samples could not be run on October 9th because no canisters were available. Duplicate samples of December 26th were invalid because their final canister pressures were zero.

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Chloroethane			0.04U	0.06	0.03U	ND	ND	ND	0.08	0.04U	0.05	ND	0.03U	0.04U	
Acetonitrile			0.26	0.24	ND	0.15	ND	ND	0.38	0.16	0.26	0.21	0.11	ND	
Acrolein			**1.77**	**1.74**	**0.85**	**1.22**	**1.05**	**2.05**	**1.75**	**1.09**	**1.73**	**1.02**	**1.30**	**1.20**	
Trichlorofluoromethane (Freon 11)			1.44	1.29	ND	1.33	1.23	1.63	2.06	1.78	1.83	1.41	1.51	1.48	
Acrylonitrile			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,1-Dichloroethene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Dichloromethane (Methylene Chloride)			0.22	0.16	0.15	0.22	0.22	0.17	0.22	0.23	0.26	0.23	0.22	0.25	
Carbon Disulfide			0.05U	ND	0.03U	ND	ND	ND	0.05U	0.05U	0.05U	0.09	0.04U	0.05U	

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Trichlorotrifluoroethane			0.88	0.81	0.61	1.01	0.81	1.04	0.99	0.87	1.24	0.69	0.75	0.74	
Trans-1,2-Dichloroethylene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,1-Dichloroethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Methyl tert-Butyl Ether			ND	ND	ND	ND	ND	ND	0.02U	ND	ND	ND	ND	ND	
Methyl Ethyl Ketone			4.85	2.56	ND	4.26	1.74	4.46	2.07	2.86	2.72	2.69	2.96	1.88	
Chloroprene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
cis-1,2-Dichloroethylene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Bromochloromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

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Chloroform			**0.09**	0.08	**0.09**	ND	**0.10**	ND	**0.11**	**0.10**	**0.10**	**0.09**	0.07U	**0.10**	
Ethyl tert-Butyl Ether			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2-Dichloroethane			ND	0.06U	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,1,1-Trichloroethane			0.11	0.10	0.09	0.12	0.15	0.17	0.11	0.09	0.13	0.07U	0.08U	0.07U	
Benzene			**0.39**	**0.38**	**0.41**	**0.68**	**0.56**	**0.39**	**0.62**	**0.65**	**0.67**	**0.77**	**0.54**	**0.86**	
Carbon Tetrachloride			**0.64**	**0.65**	**0.54**	**0.64**	**0.65**	**0.79**	**1.00**	**0.83**	**0.78**	**0.68**	**0.77**	**0.77**	
tert-Amyl Methyl Ether			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

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Ethyl Acrylate			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Bromodichloromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Trichloroethylene (TCE)			ND	ND	ND	ND	ND	ND	ND	0.04U	0.07U	ND	ND	ND	
Methyl Methacrylate			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
cis-1,3-Dichloropropene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Methyl Isobutyl Ketone			0.37	0.14	0.15	0.35	ND	0.37	0.12	0.20	0.21	0.24	0.18	0.16	
trans-1,3-Dichloropropene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,1,2-Trichloroethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

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Toluene			0.65	0.35	0.59	0.99	0.48	0.36	0.27	0.59	0.63	0.51	0.35	0.70	
Dibromochloromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2-Dibromoethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
n-Octane			0.07	0.04	ND	ND	ND	0.15	0.05	0.09	0.08	ND	0.05	0.07	
Tetrachloroethylene			0.05U	ND	ND	ND	ND	0.10	0.05U	0.06U	0.05U	0.08	ND	0.08	
Chlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Ethylbenzene			0.08	0.04U	0.12	0.17	0.08	0.04U	0.04U	0.15	0.09	0.09	0.06	0.12	
m,p-Xylene			0.18	0.07U	0.31	0.46	0.14	0.12	0.07U	0.34	0.17	0.16	0.10	0.24	

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Bromoform			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Styrene			0.12	ND	0.05U	0.11	ND	ND	0.02U	0.05U	ND	0.06	0.03U	0.06	
1,1,2,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
o-Xylene			0.08	0.03U	0.13	0.21	0.08	0.05	0.04U	0.14	0.08	0.08	0.04U	0.10	
1,3,5-Trimethylbenzene			0.02U	ND	0.02U	0.05	0.03U	ND	0.01U	0.04U	0.02U	0.02U	0.02U	0.02U	
1,2,4-Trimethylbenzene			0.07	0.02U	0.06	0.21	0.06	ND	0.03U	0.09	0.07	0.07	0.03U	0.06	
m-Dichlorobenzene			ND	ND	ND	ND	ND	ND	ND	0.02U	ND	ND	ND	ND	
Chloromethylbenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in sample. U = Under detection limit.

Sample of October 3rd was invalid because it was collected over a period of 33.06 hours, from October 3rd through October 4th. Duplicate samples could not be run on October 9th because no canisters were available. Duplicate samples of December 26th were invalid because their final canister pressures were zero.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

15 October to 26 December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Wed 10/3	Tues 10/9	Mon 10/15	**Sun 10/21**	**Sat 10/27**	Fri 11/2	Thurs 11/8	Wed 11/14	Tues 11/20	Mon 11/26	**Sun 12/2**	**Sat 12/8**	Fri 12/14	Thurs 12/20	Wed 12/26
p-Dichlorobenzene			ND	ND	ND	ND	ND	ND	ND	0.04U	0.02U	ND	ND	ND	
o-Dichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2,4-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	0.03U	ND	ND	ND	
Hexachloro-1,3-Butadiene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in sample. U = Under detection limit.

Sample of October 3rd was invalid because it was collected over a period of 33.06 hours, from October 3rd through October 4th. Duplicate samples could not be run on October 9th because no canisters were available. Duplicate samples of December 26th were invalid because their final canister pressures were zero.

SEASONAL STATISTICS FOR VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

Autumn Season – October, November, December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15
Method Detection Limits (MDLs) and VOC concentrations (mean, range, standard deviation, and coefficient of variation) are in $\mu g/m^3$
VOC concentrations that were undetected (flagged ND or U) were set equal to ½ their MDL, then included in calculation of statistics
Total number (n) of valid samples during season = 12
* = statistics not calculated

VOC (boldface indicates VOC exceeded an EPA benchmark, ODEQ MAAC, or ATSDR MRL in one or more samples)	MDL reported by ERG	Number of samples in which VOC was detected	Arithmetic mean concentration of VOC	Concentration range of VOC (minimum to maximum)	Sample standard deviation (S or σ_{n-1})	Coefficient of variation (CV)	Number of times VOC concentration exceeded EPA benchmark	Number of times VOC concentration exceeded ODEQ MAAC	Number of times VOC concentration exceeded ATSDR MRL
Acetylene	0.029	12	0.878	0.23 – 1.75	0.554	0.631	0	0	0
Propylene	0.067	12	0.45	0.19 – 1.05	0.262	0.583	0	0	0
Dichlorodifluoromethane (Freon 12)	0.089	12	2.651	2.07 – 3.66	0.456	0.172	0	0	0
Chloromethane	0.056	12	1.232	0.54 – 1.91	0.361	0.293	**9**	0	0
Dichlorotetrafluoroethane (Freon 114)	0.147	2	0.086	ND – 0.15	0.030	0.346	0	0	0
Vinyl Chloride	0.061	0	*	ND – 0.03U	*	*	0	0	0
1,3-Butadiene	0.040	2	0.028	ND – 0.10	0.023	0.832	**2**	0	0
Bromomethane	0.097	0	*	ND – 0.07U	*	*	0	0	0

SEASONAL STATISTICS FOR VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

Autumn Season – October, November, December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15

Method Detection Limits (MDLs) and VOC concentrations (mean, range, standard deviation, and coefficient of variation) are in $\mu g/m^3$

VOC concentrations that were undetected (flagged ND or U) were set equal to ½ their MDL, then included in calculation of statistics

Total number (n) of valid samples during season = 12

* = statistics not calculated

VOC (boldface indicates VOC exceeded an EPA benchmark, ODEQ MAAC, or ATSDR MRL in one or more samples)	MDL reported by ERG	Number of samples in which VOC was detected	Arithmetic mean concentration of VOC	Concentration range of VOC (minimum to maximum)	Standard deviation (S or σ_{n-1})	Coefficient of variation (CV)	Number of times VOC concentration exceeded EPA benchmark	Number of times VOC concentration exceeded ODEQ MAAC	Number of times VOC concentration exceeded ATSDR MRL
Chloroethane	0.050	3	0.035	ND – 0.08	0.019	0.529	0	0	0
Acetonitrile	0.054	8	0.157	ND – 0.38	0.117	0.745	0	0	0
Acrolein	0.057	12	1.398	0.85 – 2.05	0.388	0.277	**12**	**1**	**12**
Trichlorofluoromethane (Freon 11)	0.124	11	1.421	ND – 2.06	0.493	0.347	0	0	0
Acrylonitrile	0.052	0	*	ND	*	*	0	0	0
1,1-Dichloroethene	0.087	0	*	ND	*	*	0	0	0
Dichloromethane (Methylene Chloride)	0.052	12	0.213	0.15 – 0.26	0.034	0.162	0	0	0
Carbon Disulfide	0.065	1	0.037	ND – 0.09	0.017	0.449	0	0	0

SEASONAL STATISTICS FOR VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

Autumn Season – October, November, December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15
Method Detection Limits (MDLs) and VOC concentrations (mean, range, standard deviation, and coefficient of variation) are in $\mu g/m^3$
VOC concentrations that were undetected (flagged ND or U) were set equal to ½ their MDL, then included in calculation of statistics
Total number (n) of valid samples during season = 12
* = statistics not calculated

VOC (boldface indicates VOC exceeded an EPA benchmark, ODEQ MAAC, or ATSDR MRL in one or more samples)	MDL reported by ERG	Number of samples in which VOC was detected	Arithmetic mean concentration of VOC	Concentration range of VOC (minimum to maximum)	Standard deviation (S or σ_{n-1})	Coefficient of variation (CV)	Number of times VOC concentration exceeded EPA benchmark	Number of times VOC concentration exceeded ODEQ MAAC	Number of times VOC concentration exceeded ATSDR MRL
Trichlorotrifluoroethane	0.161	12	0.87	0.61 – 1.24	0.175	0.202	0	0	0
Trans-1,2-Dichloroethylene	0.063	0	*	ND	*	*	0	0	0
1,1-Dichloroethane	0.065	0	*	ND	*	*	0	0	0
Methyl tert-Butyl Ether	0.032	0	*	ND – 0.02U	*	*	0	0	0
Methyl Ethyl Ketone	0.121	11	2.759	ND – 4.85	1.321	0.479	0	0	0
Chloroprene	0.047	0	*	ND	*	*	0	0	0
cis-1,2-Dichloroethylene	0.067	0	*	ND	*	*	0	0	0
Bromochloromethane	0.095	0	*	ND	*	*	0	0	0

SEASONAL STATISTICS FOR VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

Autumn Season – October, November, December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15
Method Detection Limits (MDLs) and VOC concentrations (mean, range, standard deviation, and coefficient of variation) are in $\mu g/m^3$
VOC concentrations that were undetected (flagged ND or U) were set equal to ½ their MDL, then included in calculation of statistics
Total number (n) of valid samples during season = 12
* = statistics not calculated

VOC (boldface indicates VOC exceeded an EPA benchmark, ODEQ MAAC, or ATSDR MRL in one or more samples)	MDL reported by ERG	Number of samples in which VOC was detected	Arithmetic mean concentration of VOC	Concentration range of VOC (minimum to maximum)	Standard deviation (S or σ_{n-1})	Coefficient of variation (CV)	Number of times VOC concentration exceeded EPA benchmark	Number of times VOC concentration exceeded ODEQ MAAC	Number of times VOC concentration exceeded ATSDR MRL
Chloroform	0.083	9	0.082	ND – 0.11	0.026	0.312	**8**	0	0
Ethyl tert-Butyl Ether	0.033	0	*	ND	*	*	0	0	0
1,2-Dichloroethane	0.085	0	*	ND – 0.06U	*	*	0	0	0
1,1,1-Trichloroethane	0.087	9	0.100	0.07U – 0.17	0.041	0.412	0	0	0
Benzene	0.077	12	0.577	0.38 – 0.86	0.160	0.278	**12**	0	0
Carbon Tetrachloride	0.094	12	0.728	0.54 – 1.00	0.121	0.166	**12**	0	0
tert-Amyl Methyl Ether	0.046	0	*	ND	*	*	0	0	0
1,2-Dichloropropane	0.088	0	*	ND	*	*	0	0	0

SEASONAL STATISTICS FOR VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

Autumn Season – October, November, December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15
Method Detection Limits (MDLs) and VOC concentrations (mean, range, standard deviation, and coefficient of variation) are in $\mu g/m^3$
VOC concentrations that were undetected (flagged ND or U) were set equal to ½ their MDL, then included in calculation of statistics
Total number (n) of valid samples during season = 12
* = statistics not calculated

VOC (boldface indicates VOC exceeded an EPA benchmark, ODEQ MAAC, or ATSDR MRL in one or more samples)	MDL reported by ERG	Number of samples in which VOC was detected	Arithmetic mean concentration of VOC	Concentration range of VOC (minimum to maximum)	Standard deviation (S or σ_{n-1})	Coefficient of variation (CV)	Number of times VOC concentration exceeded EPA benchmark	Number of times VOC concentration exceeded ODEQ MAAC	Number of times VOC concentration exceeded ATSDR MRL
Ethyl Acrylate	0.061	0	*	ND	*	*	0	0	0
Bromodichloromethane	0.121	0	*	ND	*	*	0	0	0
Trichloroethylene (TCE)	0.097	0	*	ND – 0.07U	*	*	0	0	0
Methyl Methacrylate	0.057	0	*	ND	*	*	0	0	0
cis-1,3-Dichloropropene	0.068	0	*	ND	*	*	0	0	0
Methyl Isobutyl Ketone	0.066	11	0.210	ND – 0.37	0.106	0.504	0	0	0
trans-1,3-Dichloropropene	0.068	0	*	ND	*	*	0	0	0
1,1,2-Trichloroethane	0.093	0	*	ND	*	*	0	0	0

SEASONAL STATISTICS FOR VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

Autumn Season – October, November, December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15
Method Detection Limits (MDLs) and VOC concentrations (mean, range, standard deviation, and coefficient of variation) are in $\mu g/m^3$
VOC concentrations that were undetected (flagged ND or U) were set equal to ½ their MDL, then included in calculation of statistics
Total number (n) of valid samples during season = 12
* = statistics not calculated

VOC (boldface indicates VOC exceeded an EPA benchmark, ODEQ MAAC, or ATSDR MRL in one or more samples)	MDL reported by ERG	Number of samples in which VOC was detected	Arithmetic mean concentration of VOC	Concentration range of VOC (minimum to maximum)	Standard deviation (S or σ_{n-1})	Coefficient of variation (CV)	Number of times VOC concentration exceeded EPA benchmark	Number of times VOC concentration exceeded ODEQ MAAC	Number of times VOC concentration exceeded ATSDR MRL
Toluene	0.064	12	0.539	0.27 – 0.99	0.199	0.369	0	0	0
Dibromochloromethane	0.119	0	*	ND	*	*	0	0	0
1,2-Dibromoethane	0.100	0	*	ND	*	*	0	0	0
n-Octane	0.033	8	0.056	ND – 0.15	0.040	0.713	0	0	0
Tetrachloroethylene	0.075	3	0.050	ND – 0.10	0.023	0.456	0	0	0
Chlorobenzene	0.060	0	*	ND	*	*	0	0	0
Ethylbenzene	0.052	9	0.087	0.04U – 0.17	0.048	0.548	0	0	0
m,p-Xylene	0.091	10	0.193	0.07U – 0.46	0.125	0.646	0	0	0

SEASONAL STATISTICS FOR VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

Autumn Season – October, November, December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15
Method Detection Limits (MDLs) and VOC concentrations (mean, range, standard deviation, and coefficient of variation) are in μg/m³
VOC concentrations that were undetected (flagged ND or U) were set equal to ½ their MDL, then included in calculation of statistics
Total number (n) of valid samples during season = 12
* = statistics not calculated

VOC (boldface indicates VOC exceeded an EPA benchmark, ODEQ MAAC, or ATSDR MRL in one or more samples)	MDL reported by ERG	Number of samples in which VOC was detected	Arithmetic mean concentration of VOC	Concentration range of VOC (minimum to maximum)	Standard deviation (S or σ_{n-1})	Coefficient of variation (CV)	Number of times VOC concentration exceeded EPA benchmark	Number of times VOC concentration exceeded ODEQ MAAC	Number of times VOC concentration exceeded ATSDR MRL
Bromoform	0.145	0	*	ND	*	*	0	0	0
Styrene	0.051	4	0.046	ND – 0.12	0.035	0.757	0	0	0
1,1,2,2-Tetrachloroethane	0.110	0	*	ND	*	*	0	0	0
o-Xylene	0.052	9	0.086	0.03U – 0.21	0.054	0.634	0	0	0
1,3,5-Trimethylbenzene	0.049	1	0.027	ND – 0.05	0.007	0.273	0	0	0
1,2,4-Trimethylbenzene	0.049	8	0.066	ND – 0.21	0.051	0.769	0	0	0
m-Dichlorobenzene	0.090	0	*	ND – 0.02U	*	*	0	0	0
Chloromethylbenzene	0.057	0	*	ND	*	*	0	0	0

SEASONAL STATISTICS FOR VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

Autumn Season – October, November, December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15
Method Detection Limits (MDLs) and VOC concentrations (mean, range, standard deviation, and coefficient of variation) are in $\mu g/m^3$
VOC concentrations that were undetected (flagged ND or U) were set equal to ½ their MDL, then included in calculation of statistics
Total number (n) of valid samples during season = 12
* = statistics not calculated

VOC (boldface indicates VOC exceeded an EPA benchmark, ODEQ MAAC, or ATSDR MRL in one or more samples)	MDL reported by ERG	Number of samples in which VOC was detected	Arithmetic mean concentration of VOC	Concentration range of VOC (minimum to maximum)	Standard deviation (S or σ_{n-1})	Coefficient of variation (CV)	Number of times VOC concentration exceeded EPA benchmark	Number of times VOC concentration exceeded ODEQ MAAC	Number of times VOC concentration exceeded ATSDR MRL
p-Dichlorobenzene	0.090	0	*	ND – 0.04U	*	*	0	0	0
o-Dichlorobenzene	0.096	0	*	ND	*	*	0	0	0
1,2,4-Trichlorobenzene	0.297	0	*	ND – 0.03U	*	*	0	0	0
Hexachloro-1,3-Butadiene	0.384	0	*	ND	*	*	0	0	0

SEASONAL STATISTICS FOR VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

Autumn Season – October, November, December, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15
Method Detection Limits (MDLs) and VOC concentrations (mean, range, standard deviation, and coefficient of variation) are in $\mu g/m^3$
VOC concentrations that were undetected (flagged ND or U) were set equal to ½ their MDL, then included in calculation of statistics
Total number (n) of valid samples during season = 12
* = statistics not calculated

VOC (boldface indicates VOC exceeded an EPA benchmark, ODEQ MAAC, or ATSDR MRL in one or more samples)	MDL reported by ERG	Number of samples in which VOC was detected	Arithmetic mean concentration of VOC	Concentration range of VOC (minimum to maximum)	Standard deviation (S or σ_{n-1})	Coefficient of variation (CV)	Number of times VOC concentration exceeded EPA benchmark	Number of times VOC concentration exceeded ODEQ MAAC	Number of times VOC concentration exceeded ATSDR MRL
Bromoform	0.145	0	*	ND	*	*	0	0	0
Styrene	0.051	4	0.046	ND – 0.12	0.035	0.757	0	0	0
1,1,2,2-Tetrachloroethane	0.110	0	*	ND	*	*	0	0	0
o-Xylene	0.052	9	0.086	0.03U – 0.21	0.054	0.634	0	0	0
1,3,5-Trimethylbenzene	0.049	1	0.027	ND – 0.05	0.007	0.273	0	0	0
1,2,4-Trimethylbenzene	0.049	8	0.066	ND -- 0.21	0.051	0.769	0	0	0
m-Dichlorobenzene	0.090	0	*	ND – 0.02U	*	*	0	0	0
Chloromethylbenzene	0.057	0	*	ND	*	*	0	0	0

APPENDIX C
ASSESSMENT OF PROBLEMS WITH DUPLICATE VOC SAMPLES

ASSESSMENT OF PROBLEMS WITH DUPLICATE VOC SAMPLES

As shown on the accompanying Table, valid duplicate VOC canister samples were collected on six of eleven scheduled sample dates. Duplicate samples collected on four of the eleven dates had to be invalidated for various reasons. Duplicate samples could not be collected as scheduled on 10/9/2007 because no sample canisters were available on that date.

The samples collected on 4/21/2007 and 12/26/2007 were invalidated because the final canister pressures were zero (ambient). Canister leakage should be suspected any time the final canister pressure is zero, even though a leak may not actually have occurred. The final pressure of zero observed in the samples collected on 4/21/07 might have resulted from the failure of the HVAC system inside the sample shelter. The temperature inside the shelter on that date rose to more than 120°F, which may have increased the pressure inside the sample canisters to zero or positive values. Thus a leak may not actually have occurred from those sample canisters. Nevertheless, samples must be invalidated any time the final canister pressure is zero. The samples collected on 4/21/07 and 12/26/07 were invalidated because of factors that may have been beyond the ability of CNEP staff to control.

The samples collected on 4/18/2007 were invalidated because the initial pressure in one of the two canisters was too high. A leak may have occurred from this canister prior to its use for sample collection. As a result, the initial pressure of the sample system was too high (- 15 in. Hg). The leaking canister should not have been used by CNEP staff for duplicate sample collection.

The samples collected on 6/29/2007 were invalidated because the sample collection period exceeded the maximum allowable period of 26 hours. This problem resulted from operator error or oversight. This problem could have been prevented. CNEP staff should be certain that the proper sample collection period is programmed into the RM910A prior to each sampling event.

Further assessment of the data in the accompanying Table reveals no obvious causes that may contribute to the problems we've had with duplicate samples. Sample canisters used for invalid duplicate samples have been used successfully for the collection of valid single samples as well as for other duplicate samples that were valid. Thus canisters used for invalid duplicate samples do not appear to be damaged or defective.

A canister should be used for sample collection only if its initial pressure is – 29 or – 30 inches of Hg. Valid samples can have final canister pressures that are either negative or positive but not zero. As mentioned above, a final pressure of zero raises the possibility that a leak occurred.

Valid duplicate samples were collected even when the final flow rate was 6.9 cc/min instead of 6.8 cc/min. The incidence of invalid samples has not increased lately. A thorough review of our field sample report forms (white and pink sheets) reveals no evidence of significant variation in flow rates or final canister pressures. Thus there is no evidence of a problem with the mass flow controller of the RM910A. Nevertheless, a flow verification check, using the Hastings Model HBM-1A Primary Standard bubble-type volumetric flow meter, could be performed on the RM910A to verify that its flow rates are still accurate at 3.4 cc/min and at 6.8 cc/min.

The system pressure should not affect either the flow rate nor the final canister pressure. A system pressure of anywhere from 20 to 25 psig should work well in Oklahoma's climate. In fact, valid samples have been obtained even when the final system pressure was outside of this range.

The weather should not affect the validity of a sample unless ice or moisture gets into the sample collection apparatus. Moisture in the sampling apparatus could affect the mass flow controller of the RM910A and cause the final flow rates and/or the final canister pressures to vary considerably. A thorough review of our field sample report forms (white and pink sheets) reveals no evidence that this problem has occurred. Furthermore, the humidity in Oklahoma is not consistently high enough to make such a problem likely to occur.

The HVAC system at the Pryor site failed on 10/26/2006 and on 4/21/2007. On each of these occasions, the temperature inside the shelter rose above 120°F. Nevertheless, these high shelter temperatures did not affect the performance of the RM910A, as samples collected immediately after these dates (10/26 and 4/21) were valid.

Results for duplicate samples were compared with results for single samples. Three single samples have been declared invalid. One of these single samples was invalid because it was collected over a period of 33.06 hours. The other two single samples were invalid because their final canister pressures were zero. One of these two samples had a final canister pressure of +2 when it was collected by CNEP, but it had a canister pressure of zero when it was received by ERG. There is no obvious reason why the other invalid single sample had a final canister pressure of zero. In any case, two single samples and two duplicate samples have been declared invalid because they had final canister pressures of zero. Thus there is no evidence that the more complex tubing (more tubing and more connectors) used for duplicate samples is more prone to leaks than the simpler tubing used for single samples.

A review of daily datalogger reports for the Pryor site revealed that no power outages or power surges occurred on any of the ten dates on which duplicate samples were collected. Likewise, no power outages or power surges occurred on the dates on which the three invalid single samples were collected.

A thorough review of our field sample report forms (white and pink sheets) reveals no evidence of consistent or repeated operator error. A mistake made by a particular operator at one time was not repeated by that same operator on subsequent sample occasions.

In summary, four duplicate samples and three single samples have been declared invalid as of 12/26/2007. Two of these samples were invalid because their sample collection period was too long (> 24 ± 2 hours). The duplicate samples of 4/18/2007 were invalid because one of the two canisters had a suspected leak prior to sample collection. The single sample of 12/1/2006 was invalid because it arrived at ERG with a canister pressure of zero. The remaining three samples were invalid because they had final canister pressures of zero when collected by CNEP. There is no obvious reason why these remaining three samples had final canister pressures of zero, but several recommendations for action are offered in the following paragraphs.

Recommendations for action.

(1) At our earliest convenience, perform a flow verification check of the RM910A at the Pryor site in accordance with our flow verification SOP (see SOP included with this report). The flow verification should measure the accuracy with which the RM910A can produce flow rates of 3.4 cc/min and 6.8 cc/min. Also, conduct a visual inspection of the mass flow controller and other internal tubing and connections of the RM910A, but do not disassemble any of these parts. The visual inspection should look for signs of leakage, moisture, or corrosion as well as worn, broken, or loose-fitting parts.

(2) Conduct a visual inspection of sample canisters and tubing at the Pryor site before and after each sample event, looking for signs of leakage, moisture, or corrosion as well as worn, broken, or loose-fitting parts.

Kent Curtis

From: Kent Curtis
Sent: Thursday, January 03, 2008 11:23 AM
To: CNEP-AirNow
Subject: assessment of problems with duplicate VOC samples

We have 18 VOC samples (including 6 duplicates on 3 sample dates) left to collect before the end of sample collection on March 25th. At least 14 of the remaining 18 samples must be valid for us to attain our data completion goal of 85%. I'm concerned about this because we keep having trouble with our duplicate samples. Each time we have to invalidate duplicate samples we lose TWO samples instead of just one. So we need to do whatever we can to ensure that our remaining duplicate samples are valid (final canister pressure less than zero).

I've performed a thorough review of our sample event records in an attempt to identify the factors that caused us to invalidate VOC samples. Some factors were things that could have been prevented: that is, factors within our control. Other factors were beyond our control. Finally, there is no obvious reason why several of our invalid samples had final canister pressures of zero. I've written an assessment report that addresses my findings (see attached narrative and table). Please read it at your convenience.

I don't think anything is wrong with our RM910A, canisters, and tubing. Nevertheless, Ryan and I are recommending that the following actions be taken BEFORE the next duplicate sample date of Sunday, January 13th.

Recommendations for action.

(1) Perform a flow verification check of the RM910A at the Pryor site in accordance with our flow verification SOP (see SOP attached to this e-mail). The flow verification should measure the accuracy with which the RM910A can produce flow rates of 3.4 cc/min and 6.8 cc/min. Also, conduct a visual inspection of the mass flow controller and other internal tubing and connections of the RM910A, but do not disassemble any of these parts. The visual inspection should look for signs of leakage, moisture, or corrosion as well as worn, broken, or loose-fitting parts. The flow verification and visual inspection should be done at the Pryor site. The RM910A should not be brought back to our office for inspection and flow verification. Please confer with me before you perform these procedures.

(2) Conduct a visual inspection of sample canisters and tubing at the Pryor site before and after each sample event, looking for signs of leakage, moisture, or corrosion as well as worn, broken, or loose-fitting parts.

Kent Curtis

From: Kent Curtis
Sent: Monday, February 25, 2008 4:18 PM
To: 'Julie.Swift@erg.com'
Cc: 'Rodney.Williams@erg.com'; CNEP-AirNow
Subject: Another VOC duplicate problem

Julie,
The duplicate VOC canister samples we collected on February 24th finished with a final pressure of +22. I don't know why the final pressure was so high. The only reasons I can think of for this are the following: (1) the valve on one of the two canisters wasn't opened, so, with a flow rate of 6.8 instead of 3.4, twice as much air was pumped into the other canister [if this was the case, then the canister with sample air in it would be invalid, wouldn't it?]; or (2) a leak occurred in the system.

One of the two canisters used for the duplicate samples wasn't ours: it was a canister from ADEQ (Arkansas or Arizona), and that canister has a pressure gauge on it, which our canisters do not. The pressure on the canister gauge may never have changed during the entire process of setup, sample collection, and canister collection. This makes me suspect this canister was never opened and that no sample air entered it. Can you check this to see if that is the case? If no sample air entered the canister, then we know what went wrong with this latest duplicate sample.

In any case, it looks like both canisters will be invalid samples. Let's discuss this so we'll both be in agreement on this point.

Please send us two more of our own canisters by Thursday, February 28th, so we can set up another duplicate to run on Saturday. Please don't send us any canisters that aren't our own Cherokee Nation canisters. I don't want to compromise any of our sample results by using canisters we aren't familiar with or that might be of unknown age and internal condition.

Thanks.

Kent Curtis
Cherokee Nation Environmental Programs
918-453-5095
kcurtis@cherokee.org

Kent Curtis

From: Kent Curtis
Sent: Wednesday, March 19, 2008 9:44 AM
To: 'Julie.Swift@erg.com'
Subject: FW: update on VOC canister problem

Julie,
What was the pressure in the Arizona/Arkansas canister (canister number AZ26) when you received it from us? Do you think it may be a valid sample? Do you think our CNEP canister 3628 was a valid sample?
Kent

-----Original Message-----
From: Kent Curtis
Sent: Tuesday, February 26, 2008 8:38 AM
To: CNEP-AirNow
Subject: update on VOC canister problem

I talked with Julie Swift of ERG this morning. She agreed with me that the Arizona/Arkansas canister may not have been opened prior to sample collection. ERG will check that canister when they receive it from us and find out if it still has a vacuum in it. If it still has a vacuum, then it may never have been opened. Julie said the other canister (CNEP canister no. 3628) may still produce a valid sample, even if it has a final pressure of +22. So we may still get one valid sample out of the two that were collected on February 24.

ERG will not send us any more canisters that are not our own CNEP canisters. Julie said the gauge on the Arizona/Arkansas canister is useless. She said such canister gauges fail as soon as they are exposed to high altitude pressures in airplanes. After such exposures, those gauges never work properly again. Knowing this, we should NEVER order any canisters with gauges on them.

ERG is sending us two or three canisters today so we can set up another duplicate to run this Saturday, March 1st.

Kent

APPENDIX D
PROPOSED FORMAT AND CONTENT OF FINAL PROJECT REPORT THAT ERG WILL SUBMIT TO CNEP

Kent Curtis

From: Kent Curtis
Sent: Monday, January 28, 2008 4:59 PM
To: 'Julie.Swift@erg.com'; Ryan Callison
Subject: Final report for Cherokee Nation VOC monitoring project

Julie and Ryan,
This e-mail summarizes what we've agreed on with respect to the Final Report that ERG will submit to the CNEP for our VOC monitoring project at Cherokee Heights.

ERG will submit the final report to CNEP some time in June, 2008. I suggest that ERG submit a draft report to CNEP so we can review and edit the content prior to completion of the final report. The cost of the final report is already included in the existing contract for services between ERG and Cherokee Nation.

The content of the final report will follow the same format as the UATMP Final Report for 2006. The final report will contain all 18 months of the CNEP's VOC project data. The final report will also contain ODEQ data for VOC monitoring stations in Tulsa for the purpose of comparing air quality and human health risks at Cherokee Heights to that of Tulsa. Will ODEQ object to this?

Contents of the final report will include VOC data tables, meteorological data tables, pollution rose diagrams, wind rose diagrams, human health risk assessment, and information about emissions sources and vehicular traffic in Cherokee Heights vicinity.

Statistics in final report will include:
number of samples
number of VOCs detected in each sample
number of non-detects in each sample
%detects in each sample
arithmetic mean concentration of each VOC
median concentration of each VOC
minimum and maximum concentrations of each VOC
standard deviation of concentration for each VOC
coefficient of variation
precision data (relative % difference) for duplicate samples
ratios for benzene/ethylbenzene, toluene/ethylbenzene, and xylenes/ethylbenzene; benzene/toluene also?

ERG will report seasonal data according to the following seasons:
winter (Jan.1 through March 31)
spring (April 1 through June 30)
summer (July 1 through Sept. 30)
autumn (Oct. 1 through Dec. 31)

Site location map for CNEP monitoring station at Cherokee Heights needs to be improved, clarified. CNEP can submit a site map to ERG if requested.

Map showing emissions sources near CNEP site may need additional sources listed. CNEP may provide ERG with information about more emissions sources in Mid-America Industrial Park.

Amount of vehicular traffic near CNEP site may be underestimated in UATMP report. CNEP thinks that there may be significant vehicular traffic (particularly truck traffic) on highways 412, 69, 69a, and 412b, which surround Mid-America Industrial Park and which are within 2 to 5 miles of CNEP's VOC monitoring site. We need to discuss the estimates of vehicular traffic that will go into the final report.

Kent Curtis
Cherokee Nation Environmental Programs
918-453-5095
kcurtis@cherokee.org

APPENDIX E
LETTER TO MARCY KLASS-JONES, WITH ITS ENCLOSURES

CHEROKEE NATION

P.O. Box 948
Tahlequah, OK 74465-0948
918-456-0671

Chad "Corntassel" Smith
[illegible]
Principal Chief

Joe Grayson, Jr.
[illegible]
Deputy Principal Chief

20 February, 2008

Marcy Klass-Jones
20112 South River Ranch
Claremore, Oklahoma 74019

RE: AMBIENT AIR MONITORING FOR VOCs AT CHEROKEE HEIGHTS

Dear Ms. Klass-Jones:

As I explained to you on the phone, the Cherokee Nation's Environmental Programs (CNEP) has been monitoring ambient (outdoor) air quality at the Cherokee Heights community for several years. The CNEP has been monitoring volatile organic compounds (VOCs) at that location since 2005. The enclosed information summarizes what we've learned so far about VOCs in ambient air at Cherokee Heights.

The enclosed slides explain what hazardous air pollutants (including VOCs) are and why the CNEP is monitoring them at Cherokee Heights. The CNEP has found that eight VOCs have been present in one or more samples at concentrations that exceed such human health benchmarks as U. S. Environmental Protection Agency (EPA) screening levels and Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels (MRLs). These same VOCs tend to be present at higher concentrations in the urban/industrial air environment of Tulsa (see enclosed table which compares VOC data for Cherokee Heights with VOC data for Tulsa).

Eastern Research Group (ERG) has analyzed VOC data for both Cherokee Heights and Tulsa for the year 2006. ERG has estimated that the risk posed to human health by VOCs in ambient air at Cherokee Heights is minimal or insignificant. That is, the incidence of cancer caused by VOCs may be only 3 cases in a population of one million; and the risk of non-cancer illnesses caused by such VOCs is probably insignificant. The risk of cancer and non-cancer illnesses caused by VOCs is estimated to be somewhat greater in Tulsa, where the concentrations of VOCs in ambient air are greater.

ERG has not yet estimated the risk based on 2007 data. The concentrations of VOCs in ambient air at Cherokee Heights have not changed significantly since 2006. Thus I don't expect the risks posed to human health by VOCs will be any greater now than they were in 2006.

Please call me if you have any questions.

Sincerely,

Kent Curtis

Kent Curtis, Environmental Specialist II
Cherokee Nation Environmental Programs
P. O. Box 948
Tahlequah, Oklahoma 74465
918-453-5095

RC Concur: Ryan Callison, Environmental Specialist III, CNEP

Enclosures

CC: CNEP Files

COMPARISON OF VOC CONCENTRATIONS IN TULSA AND IN CHEROKEE HEIGHTS NEAR PRYOR, 2006

All concentrations are in $\mu g/m^3$

VOC	*	VOC CONCENTRATIONS AT ODEQ SITES IN TULSA												VOC CONCENTRATIONS AT CHEROKEE HEIGHTS (Sept.-Dec., 2006)		
		Site 191 (Downtown)				Site 235 (Refineries)				Site 172 (Northside)						
		n	max	mean	UCL	n	max	mean	UCL	n	max	mean	UCL	n	range	mean
Acrylonitrile	T	0				1	0.43			31	4.47	0.22	0.49	0		
Benzene	T	32	4.73	1.41	1.68	46	6.29	2.34	2.76	31	5.24	1.18	1.50	17	0.32-0.90	0.55
1,3-Butadiene	T	32	0.35	0.09	0.11	40	0.20	0.09	0.10	30	**0.53**	0.09	0.13	10	0.02-0.04	0.03
Carbon Tetrachloride	=	32	1.01	0.63	0.72	46	1.01	0.59	0.65	30	0.94	0.69	0.74	17	0.50-1.01	0.77
Chloroform	T	24	0.83	0.15	0.20	23	0.24	0.12	0.14	18	0.15	0.10	0.11	15	0.05-0.10	0.08
Ethylbenzene	T	32	2.17	0.61	0.77	46	1.74	0.66	0.78	31	**7.55**	2.04	**2.67**	16	0.04-0.26	0.11
Ethylene Dichloride (1,2-Dichloroethane)	=	0				1	0.08			0				1	0.12	
Methylene Chloride	T	32	1.11	0.35	0.40	43	**6.22**	0.48	0.76	31	**48.65**	**2.92**	**6.50**	17	0.14-0.24	0.19
1,1,2,2-Tetrachloroethane	=	0				0				0				0		
Toluene	T	32	**30.90**	6.44	8.78	46	**17.14**	6.69	7.86	31	**30.90**	8.48	10.69	17	0.19-1.25	0.58
Vinyl Chloride	=	1	0.03			1	0.03			1	0.03			0		
Acrolein	=	32	2.64	0.94	1.13	46	3.97	0.93	1.12	31	4.54	1.35	1.71	15	0.39-4.30	2.39
Benzene/Toluene ratio				0.22				0.35				0.14				0.95

* Concentrations generally higher in Tulsa (T) or in Cherokee Heights (CH); or concentrations generally the same (=) in both Tulsa and Cherokee Heights
n = Number of valid readings over detection limit
max = maximum concentration
mean = mean concentration in n valid readings over detection limit
UCL = 95% upper confidence limit
range = concentration range of VOC (minimum to maximum)
Concentrations shown in **boldface** exceed Cherokee Heights concentration range by at least one order of magnitude